77TH CONGRESS } HOUSE OF REPRESENTATIVES { DOCUMENT
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# CHANNEL FROM PUGET SOUND INTO LAKE CROCKETT (KEYSTONE HARBOR), WASH.

## LETTER

FROM

## THE SECRETARY OF WAR

TRANSMITTING

A LETTER FROM THE CHIEF OF ENGINEERS, UNITED STATES ARMY, DATED APRIL 29, 1941, SUBMITTING A REPORT, TOGETHER WITH ACCOMPANYING PAPERS AND AN ILLUSTRATION, ON REEXAMINATION OF CHANNEL FROM PUGET SOUND INTO LAKE CROCKETT, WASH., WITH A VIEW TO DETERMINING IF IT IS ADVISABLE TO IMPROVE THE AREA KNOWN AS KEYSTONE HARBOR IN ANY WAY, REQUESTED BY RESOLUTION OF THE COMMITTEE ON RIVERS AND HARBORS, HOUSE OF REPRESENTATIVES, ADOPTED MAY 29, 1940

JULY 1, 1941.—Referred to the Committee on Rivers and Harbors and ordered to be printed with an illustration

WAR DEPARTMENT,
*Washington, June 25, 1941.*

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

DEAR MR. SPEAKER: I am transmitting herewith a report dated April 29, 1941, from the Chief of Engineers, United States Army, on reexamination of channel from Puget Sound into Lake Crockett, Wash., requested by resolution of the Committee on Rivers and Harbors, House of Representatives, adopted May 29, 1940, together with accompanying papers and illustration.

The Bureau of the Budget has been consulted and advises that, in view of the relation of the project to the national defense, there would be no objection to the submission of the proposed favorable report to the committee.

Sincerely yours,

HENRY L. STIMSON,
*Secretary of War*

60158—41

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
*Washington, April 29, 1941.*

The CHAIRMAN, COMMITTEE ON RIVERS AND HARBORS,
*House of Representatives, Washington, D. C.*

MY DEAR MR. CHAIRMAN: 1. The Committee on Rivers and Harbors of the House of Representatives, by resolution adopted May 29, 1940, requested the Board of Engineers for Rivers and Harbors to review the reports on channel from Puget Sound into Lake Crockett, Wash., submitted June 2, 1939, and previous reports, with a view to determining if it is advisable to improve the area known as Keystone Harbor in any way at this time. I enclose the report of the Board in response thereto.

2. After full consideration of the reports secured from the district and division engineers and communications from the Navy Department relative to the national-defense value of the project, the Board recommends improvement of Lake Crockett, Wash., to provide a basin therein with an area of about 6 acres and depth of 18 feet, connected with Admiralty Bay by a channel of the same depth and 150 feet wide, protected by a breakwater; all generally as indicated on the accompanying map, at an estimated first cost of $225,000, with $3,000 annually for maintenance.

3. After due consideration of these reports, I concur in the views and recommendations of the Board.

Very truly yours,

J. L. SCHLEY,
*Major General,*
*Chief of Engineers.*

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REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS

WAR DEPARTMENT,
BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
*Washington, March 31, 1941.*

Subject: Channel from Puget Sound into Lake Crockett (Keystone Harbor), Wash.

To: The Chief of Engineers, United States Army.

1. This report is in response to the following resolution adopted May 29, 1940:

*Resolved by the Committee on Rivers and Harbors of the House of Representaives, United States,* That the Board of Engineers for Rivers and Harbors created under section 3 of the River and Harbor Act, approved June 13, 1902, be and is hereby, requested to review the reports on channel from Puget Sound into Lake Crockett, Washington, submitted June 2, 1939, and previous reports, with a view to determining if it is advisable to improve the area known as Keystone Harbor in any way at this time.

2. Lake Crockett is within and adjacent to the Fort Casey Military Reservation on Whidbey Island at the entrance to Puget Sound. A 500-foot strip of gravel beach separates the lake from Admiralty Bay to the southwest, an arm of Admiralty Inlet which connects Puget Sound with the Strait of Juan de Fuca. The mean range of tide in Admiralty Bay is 8.8 feet. The lake is 3 to 7 feet deep with the water at mean lake level, which is 7.7 feet above mean lower low water in the bay. No improvements of Lake Crockett have been authorized by

Congress. The Fort Casey wharf and a privately owned ferry slip are located on Admiralty Bay near the lake. The ferry operates across Admiralty Inlet to Port Townsend on Olympic Peninsula. Strong tidal currents, generally from the east, make landings at the wharf and slip difficult.

3. Whidbey Island is a farm and summer-resort area with a population of 5,000. It is connected by highway to the mainland north and east of Puget Sound, and when the ferry is operating, is part of a usual route for east-west traffic. Ferry service is normally discontinued from October to April, inclusive, because of the difficulty of landing at Whidbey Island during the heavy seas of those months. In the 5-month season of 1940, the ferry carried about 20,000 passengers and 10,000 vehicles, which is approximately three times the business it handled in 1935.

4. Local interests desire a basin dredged in the southwest corner of Lake Crockett to a depth of 18 feet with an entrance channel 150 feet wide from Admiralty Bay. They point out that a ferry slip and wharf if constructed on such a basin could be maintained at lower cost than the present facilities and that a slip so located would permit continuous operation of the ferry. The result would be a substantially shortened winter route between Olympic Peninsula and the mainland to the east and north. Navigation interests also contend that the basin is needed as a harbor of refuge, there being no other suitably sheltered area for the length of the island, about 60 miles. The United States Coast Guard has indicated that a harbor in Lake Crockett would facilitate its operations. Fort Casey is on a caretaking status and its present transportation needs are small. However, the commanding officer of the Harbor Defenses of Puget Sound has indicated the probability of expansion in the near future with greatly increased transportation requirements.

5. The district engineer estimates the initial cost of a basin of 6 acres and entrance channel 150 feet wide, both 18 feet deep, with a breakwater to prevent shoaling of the entrance, at $223,000; the annual maintenance cost at $3,000 and the total annual cost at $15,800. An existing road through the military reservation, in which the basin would be located, would afford connection to public highways. The district engineer finds that both the ferry slip and the Fort Casey wharf will need replacing in the near future and that the desired improvement would permit reduction in the annual cost of these facilities of over $3,000. He estimates that year-around operation of the ferry would reduce the cost of travel and transportation under present conditions by $15,000 annually, and probably result in establishment of regular truck and bus lines with further economies. In addition, he finds that the improvement would save transportation time, result in unevaluated transportation benefits to Fort Casey, occasionally serve as a harbor of refuge for small craft, and afford space for one or two of the smaller Coast Guard boats. The district and division engineers concur in recommending the improvement, provided local interests furnish the terminal facilities required by commercial traffic.

6. Subsequent to the reports of the district and division engineers, the Acting Secretary of the Navy, in a letter dated February 27, 1941, addressed to the Secretary of War, indicated that the Navy is inter-

ested in the proposed improvement in connection with national defense measures. The open letter has been supplemented by further official communications which it is not in the public interest to print.

VIEWS AND RECOMMENDATIONS OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS

7. The Board has given careful consideration to the reports of the district and division engineers and to the statement of the Acting Secretary of the Navy. In view of the probable commercial benefits of the improvement, and as an element in the national defense, the Board of Engineers for Rivers and Harbors recommends improvement of Lake Crockett, Wash., to provide a basin therein with an area of about 6 acres and depth of 18 feet, connected with Admiralty Bay by a channel of the same depth and 150 feet wide, protected by a breakwater; all generally as indicated on the accompanying map, at an estimated first cost of $225,000, with $3,000 annually for maintenance.

For the Board:

THOMAS M. ROBINS,
*Brigadier General, Corps of Engineers,*
*Senior Member.*

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## REEXAMINATION OF CHANNEL FROM PUGET SOUND INTO LAKE CROCKETT (KEYSTONE HARBOR), WASH.

SYLLABUS

The district engineer finds that a small harbor in Lake Crockett would effect savings in wharf maintenance and transportation costs estimated at about $17,900 annually, and that additional benefits of considerable magnitude not susceptible of evaluation would accrue to the Coast Guard, to small-boat traffic, and to both the Army and Navy in the interest of national defense. He estimates the annual carrying charges at only $15,800 and therefore recommends the adoption by the United States of a project involving improvement by dredging a basin in Lake Crockett with an area of approximately 6 acres to a depth of 18 feet at mean lower low water, connected to Admiralty Bay by a channel of the same depth and 150 feet wide, protected by a breakwater, at an estimated first cost of $223,000 and $3,000 annually thereafter for maintenance, provided local interests furnish and maintain the terminal facilities required by prospective commercial traffic.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
*Seattle, Wash., February 8, 1941.*

Subject: Review of reports on channel from Puget Sound into Lake Crockett, Wash.

To: The Division Engineer, North Pacific Division, Portland, Oreg.

1. *Authority.*—This report, with map, is submitted in compliance with departmental instructions of June 7, 1940, and pursuant to a resolution of the Committee on Rivers and Harbors of the United States House of Representatives adopted May 29, 1940, which reads as follows:

*Resolved by the Committee on Rivers and Harbors of the House of Representatives, United States*, That the Board of Engineers for Rivers and Harbors created under section 3 of the River and Harbor Act, approved June 13, 1902, be, and is hereby, requested to review the reports on channel from Puget Sound into Lake Crockett, Washington, submitted June 2, 1939, and previous reports, with a view to deter-

mining if it is advisable to improve the area known as Keystone Harbor in any way at this time.

2. *Reports under review.*—The River and Harbor Act of July 3, 1930, directed that a preliminary examination be made of a channel from Puget Sound into Lake Crockett, Wash. Neither this act nor the committee resolution placed any restrictions on the location or dimensions of the channel to be considered. On December 10, 1931, the Chief of Engineers submitted a report on preliminary examination in compliance with this act, in which he concluded that the improvement was not deemed advisable at that time for the reason that its cost would be out of proportion to the general benefits and besides it would be of doubtful utility, since the entry of vessels into a channel between jetties might be difficult and even hazardous in the strong currents prevailing at the locality. This report has not been published. No survey was recommended and no survey report was made. Under date of July 26, 1935, the Chief of Engineers submitted a review of the report dated December 10, 1931, in conformance with a resolution of the Committee on Commerce of the United States Senate, adopted February 13, 1935. This review reported that no modification of the adverse recommendations contained in the report on preliminary examination of December 10, 1931, was advisable at that time. In compliance with a resolution of the Committee on Commerce of the United States Senate adopted April 14, 1937, the district engineer on July 15, 1937, submitted a review of reports on channel from Puget Sound into Lake Crockett, Wash., recommending that no further consideration be given to the proposed improvement at that time. The division engineer recommended a survey on October 29, 1937, the Board of Engineers for Rivers and Harbors concurred in this recommendation on November 27, 1937, and the survey was ordered by the Chief of Engineers on December 2, 1937. The survey report, stating that no modification of the recommendations in previous reports was advisable at that time, was submitted by the district engineer on June 6, 1938, by the division engineer on August 1, 1938, by the Board of Engineers on May 16, 1939, and by the Chief of Engineers on June 2, 1939.

3. *Description.*—Crockett Lake is situated on the west side of Whidbey Island, in latitude 48°10′ north and longitude 122°40′ west, near and eastward of Admiralty Head. It is shown on United States Coast and Geodetic Survey Chart No. 6450. It is about 1½ miles long from east to west and has an average width of one-half mile. It lies parallel to Admiralty Bay, an arm of Admiralty Inlet, being separated from the bay by a narrow strip of gravel beach, or spit, through which salt water readily percolates at high-water stages, thus making the water of the lake brackish and maintaining its surface at about midtide level. Admiralty Inlet forms the northerly portion of Puget Sound and connects the Sound with the inner, or eastern end of the Strait of Juan de Fuca.

4. The range of tide in this locality is 8.8 feet between mean lower low water and mean higher high water; the extreme range is about 16.5 feet. Tidal currents, which are strong in Admiralty Bay, follow the shore and generally flow from east to west during both flood and ebb, so that landings at Fort Casey wharf and Keystone ferry slip are at all times difficult, and during southerly storms and as the fetch is more than 20 miles, the wave action is heavy. The spit is constantly

receiving accretions of gravel on the bay side, so that the Quartermaster wharf at Fort Casey has had to be extended to maintain sufficient depth at its face to land vessels. The battering effect of logs and other floating debris carried by the tide renders maintenance of the wharf expensive.

5. The drainage area of Crockett Lake is about 3 square miles. The lake is flanked on the west by comparatively steep hillsides. On the north and east are gentle slopes with marshland intervening. The marshland is said to comprise about 400 to 500 acres and to be useful for pastures. There is no creek of any considerable size flowing into the lake. Its level is maintained by surface drainage and springs and by percolation from Admiralty Bay. Depths in the lake vary from 3 to 7 feet below mean lake level which is 7.7 feet above mean lower low water in the bay. The gravel spit between the lake and the bay varies from 450 feet to about 800 feet in width at low tide and its maximum surface elevation is about 16 feet above mean lower low water in the bay, or about 7 feet above mean higher high water.

6. Fort Casey Military Reservation includes about one-quarter mile of the westerly end of the lake. The road to the Quartermaster wharf cuts off the extreme southwesterly corner of the lake from the main body and the entire area of the corner has become a marsh covered with bulrushes, its length along the road being about 800 feet, and along the spit about 1,200 feet. The road is constructed upon a fill which is provided with pipe culverts to drain the marsh into the lake.

7. *Tributary area.*—"With the exception of the military post of Fort Casey, there is no city, town, or settlement on or near the borders of Crockett Lake whose commerce would naturally pass through a channel from Admiralty Inlet into Crockett Lake." This statement from the preliminary examination of July 25, 1912, still holds good as far as the immediate vicinity of Crockett Lake is concerned. However, the subsequent development of highways and automobile traffic, together with the completion of a bridge connecting the northern end of Whidbey Island with the mainland, have given rise to new conditions that place this lake in a line of traffic connecting the towns on the Olympic Peninsula, by means of ferries and highways, with important cities and towns on the mainland east of Whidbey Island, particularly Anacortes, Mount Vernon, and Bellingham.

8. There are many valuable farms on Whidbey Island and several summer resorts upon its shores. The population of the island was about 5,000 in 1930. The principal town in Coupeville, the county seat of Island County, with population of about 350. The population and resources of Whidbey Island have no important bearing, however, upon the demand for this improvement, as Everett and Seattle are the marketing centers for the island. Local interests allege that Jefferson and Clallam Counties, on the Olympic Peninsula, are tributary to the proposed improvement, and the principal reason they present for this improvement, aside from its desirability as a harbor of refuge and its usefulness in national defense, is the convenience of a ferry landing there to form a connecting link for automobile traffic between those counties and the centers of population and industry on the mainland.

9. Jefferson County has a population of 8,257 (census of 1930). Most of its area is included in the Olympic National Forest. Lum-

bering and farming are the principal occupations. About 32,000 acres are in farms from which dairy products, eggs, poultry, and berries are shipped to Seattle. Clallam County has a population of 20,262 (census of 1930). Its land area comprises 1,104,640 acres, of which about 60,000 is farm land. The remainder is in timber, most of which is also in the Olympic National Forest. The manufacturing of lumber, shingles, pulp, and paper, together with logging, form the principal industries. Of the total of farm products, dairies are reported to contribute about 66 percent, poultry farms about 12 percent, all others 22 percent. Seattle is the principal market for these products. Port Townsend, the county seat of Jefferson County, has a population of 2,847, and has a paper mill rated in capacity at 150 tons daily. Port Townsend is the terminus of the Chicago, Milwaukee, St. Paul & Pacific Railroad line that traverses the Olympic Peninsula, and also of the ferry route to Whidbey Island. The largest and most important town of the Olympic Peninsula is Port Angeles, the county seat of Clallam County, which is 37.7 miles distant from Port Townsend by the railroad and has a population of 10,052. Port Angeles has two sawmills, one pulp mill, one paper mill, and one fiber-products plant. In the vicinity of Dungeness (population about 150) and Sequim (population about 400) there are many successful dairy farms. There are creameries in these towns and also at Port Angeles and at Forks in the western part of the county.

10. The principal cities on the mainland in any way affected by the proposed improvement are Seattle, population 365,580 (1930); Everett, 30,550; Bellingham, 30,602; Mount Vernon, 3,686; Anacortes, 6,397, all located in the northwestern section of the State, which is the most important section commercially and industrially. Some of the automobile traffic over this route between the east and west sides of the sound penetrates Canada, so that Vancouver and neighboring cities may properly be added to this list of cities tributary to the ferry.

11. *Railways and roads.*—The Chicago, Milwaukee, St. Paul & Pacific Railroad operates a line 69 miles in length, extending from Port Townsend through Port Angeles to Disque, in Clallam County. Connection is made with the transcontinental terminus of this company at Seattle by car ferry from Port Townsend. The Port Angeles & Western Railway extends from Port Angeles 55 miles into the timber of the Olympic Peninsula to Forks, 15 miles of track from Port Angeles to Disque being used jointly by the two companies. The cities on the eastern side of Puget Sound have connections with one or more of four transcontinental lines, namely the Northern Pacific; Great Northern; Chicago, Milwaukee, St. Paul & Pacific; and the Union Pacific.

12. A State highway "loops" the Olympic Peninsula, connecting Olympia with Aberdeen, Hoquiam, Forks, Port Angeles, and Shelton. Branches connect to Port Townsend and Port Ludlow, from which points ferry lines are operated to the mainland on the east side of the sound. An improved State secondary road extends nearly the full length of Whidbey Island about 60 miles, and has connections with the mainland by a ferry at Columbia Beach, near the south end of the island, and by bridge over Deception Pass at the north end. This bridge affords direct and convenient access to the State

highway, north of the pass, extending to Anacortes and to a connection with the Pacific Highway at Mount Vernon. The highway on Whidbey Island has a branch to Keystone ferry slip, near the proposed improvement, from which a summer ferry service is operated to Port Townsend.

13. *Bridges.*—There are no bridges in the vicinity of the proposed improvement.

14. *Prior reports.*—The following reports have been made on the proposed Keystone Harbor project:

| No. | Kind of report | Date | Recommendation of the Chief of Engineers |
|---|---|---|---|
| 1 | Preliminary examination | May 14, 1914 | Unfavorable. |
| 2 | do | Dec. 10, 1931 | Do. |
| 3 | Review of 2 | July 26, 1935 | Do. |
| 4 | Review of 3 | Dec. 2, 1937 | Ordered survey. |
| 5 | Survey | June 2, 1939 | Unfavorable. |

15. *Existing project.*—There is no existing project for a channel into Lake Crockett, Wash.

16. *Local cooperation.*—No definite offers of contribution toward the cost of the improvement have been made by local interests.

17. *Other improvements.*—No funds have been expended by local interests in connection with this project. The United States Quartermaster Department has constructed a wharf and the Puget Sound Navigation Co. a ferry slip as described in paragraph 18.

18. *Terminal and transfer facilities.*—Present facilities consist of the United States Quartermaster Department wharf and the Keystone ferry slip owned by the Puget Sound Navigation Co., both located in Admiralty Bay eastward of the site of the proposed channel into Crockett Lake. In case the proposed improvement is made, the existing facilities would be abandoned, and new wharves would be constructed within the dredged basin. As the proposed improvement is within the confines of the Fort Casey Military Reservation, any nonmilitary terminals constructed therein would be subject to the terms of a revocable license from the War Department. The road extending through the military reservation would connect the proposed ferry terminal with county and State highways beyond the reservation.

19. *Improvement desired.*—A public hearing held September 24, 1940, was attended by officials of a ferry company, a towing company, a Puget Sound freight-boat company, chambers of commerce, Olympic Peninsula industries, attorneys, members of the legislature, officers of the Army, Navy, and Coast Guard, and by other interested parties.

20. The improvement discussed in the report of June 2, 1939, a basin 18 feet deep in the corner of the lake southwest of the approach road to the Quartermaster wharf, with an entrance channel 100 feet wide dredged through the spit from Admiralty Bay and protected by a suitable breakwater, apparently satisfies the desires of interested parties, except that they believe the entrance channel should be not less than 150 feet wide.

21. The principal argument for the improvement was that it would permit year-round operation of the Keystone-Port Townsend ferry and thus effect a great saving to traffic between the Olympic Peninsula and the mainland that is now compelled to use more expensive alterna-

tive routes during the winter season. Also a ferry slip within a protected harbor could be constructed and maintained more cheaply than in its present location. It was stated that towboats, fishing vessels, and small pleasure craft require a harbor of refuge in the vicinity, that water-borne commerce with Whidbey Island might be revived by the improvement and that Lake Crockett gravel deposits could be worked at a profit. The Division Commander of the Seattle Division, United States Coast Guard, had stated at a previous hearing that there is no suitable anchorage for Coast Guard vessels or similar light craft in the vicinity of Admiralty Bay, that a life-saving station equipped for the protection of life and property is urgently needed in that locality and that the waters requiring such services could be readily reached from a base located on Crockett Lake.

22. It is believed that the needs of the harbor defenses of Puget Sound are substantially as stated in the reports under review; that the cost of maintaining the Quartermaster wharf in its present exposed location is excessive, that facilities are required for the safe mooring of artillery craft at Fort Casey, that establishment of a regular ferry service between Whidbey Island and Port Townsend would be of material aid in interfort communication. At present Fort Casey is on a caretaking status, and very little traffic is involved, but the commanding officer of the harbor defenses of Puget Sound stated in a recent communication that the prospective increase in the garrison may result in about 500 men being stationed at Fort Casey instead of the average garrison of 12 during the past year, and this would require greatly increased transportation of men and supplies to and from the fort.

23. *Commerce.*—Present commerce by this route consists mainly of the transportation of automobiles and trucks by the ferry line from Port Townsend, operated from May to September, inclusive. The president of the Puget Sound Navigation Co., operators of the ferry, reported that, including September 22, 1940, the traffic for the year totaled about 20,000 passengers and 10,000 vehicles. It is believed that year-round operation of the ferry would follow completion of the proposed improvement, and that the increase in traffic would amount to about 73 percent. This would represent a saving of about $15,000 over the cost of alternative routes now used during the nonoperating season of the ferry

24. In past years movement of supplies and passengers between Port Townsend and Fort Casey was considerable, particularly during the period of construction of the fort and during the World War period. Of recent years the fort has not been garrisoned, and traffic to it has therefore been much reduced. However, under the present campaign for national preparedness, it is anticipated that the transportation of military supplies will increase from the present yearly average of about 250 tons to about 1,300 tons or more. This increase will result whether the improvement is completed or not, but some saving in transportation costs can be anticipated if the improvement is available for use by this traffic.

25. The following table summarizes data of traffic carried by the ferry and indicates a substantial increase in traffic from 1936, due in some measure to increased business activity but probably more to the opening, during August 1935, of the Deception Pass Bridge, which affords direct connection between Whidbey Island and the mainland.

About 10 percent of this traffic is said to consist of freight trucks, the remainder of automobiles and passengers, mainly tourists.

*Comparative statement of traffic, Port Townsend-Keystone route, 1930–39*

| Year | Period operated (dates) | Days | Passengers | Vehicles |
|---|---|---|---|---|
| 1930 | May 15 to Sept. 7 | 117 | 5,277 | 3,181 |
| 1931 | May 14 to Sept. 14 | 124 | 5,233 | 3,007 |
| 1932 | do | 124 | 5,511 | 2,917 |
| 1933 | June 15 to Sept. 10 | 88 | 4,670 | 2,244 |
| 1934 | June 15 to Sept. 9 | 87 | 5,230 | 2,428 |
| 1935 | June 14 to Sept. 8 | 87 | 6,530 | 3,319 |
| 1936 | May 8 to Sept. 30 | 146 | 13,269 | 7,543 |
| 1937 | May 1 to Oct. 15 [1] | 139 | 11,250 | 6,544 |
| 1938 | do | 168 | 13,730 | 7,999 |
| 1939 | do [2] | 145 | 13,472 | 8,065 |

| | Passengers | | Vehicles | |
|---|---|---|---|---|
| | 1 way | Round trip | 1 way | Round trip |
| Rates in effect— | | | | |
| 1930–31 | $0.50 | $1.00 | $1.50 | $3.00 |
| 1932–36 | .25 | .45 | 1.00 | 1.80 |
| June 26, 1937 | .35 | .70 | 1.10 | 2.20 |
| May 1, 1938 | .30 | .60 | 1.10 | 2.20 |
| May 1, 1939 | .30 | .60 | 1.10 | 2.20 |

[1] Owing to strike, operation was interrupted for 29 days during this period.
[2] Owing to strike, operation was interrupted for 23 days during this period.

26. *Survey.*—An instrumental survey of the west half of the lake and spit was made during January 1938. The triangular area lying between the roadway leading to the Quartermaster wharf and the west shore of the lake was probed to determine the probable extent and nature of the materials. The location of the proposed improvement, together with soundings and elevations, are shown on the accompanying map.

27. *Plan of improvement.*—Consideration has been given to two alternative plans of improvement, each involving the construction of a basin in the corner of the lake southwest of the approach road to the Quartermaster wharf, with an entrance channel 150 feet wide dredged through the spit from Admiralty Bay and protected by a suitable breakwater. Estimates of cost have been based on a depth of 18 feet at mean lower low water in both the basin and the entrance channel, with an additional allowance of 1 foot for overdepth dredging. An entrance channel only 100 feet wide has also been considered, but it is believed to be impracticable because the direction of tidal currents is across the channel axis, and the outer end of the channel is not completely protected from winter storms by the proposed breakwater. Access to a narrow channel would consequently be difficult.

28. The purpose of the breakwater, or jetty, is primarily to prevent shoaling of the entrance channel by encroachment of gravel that is being moved along the beach from the east by the prevailing littoral current; it will also give some slight protection from the prevailing southerly storms. The section recommended has a crest width of 8 feet at elevation 14 feet above mean lower low water, with side slopes of 1 vertical on 1¼ horizontal, and extends southward from the high point of the spit into the deep water of Admiralty Bay.

29. Depths reached by probing with a water jet ranged from −0.9 to −9.0 feet and averaged −6.0 feet at mean lower low water. The material penetrated is thought to consist of a mixture of sand, silt, and heavy gravel, as that is the material exposed on the spit. During the construction of Fort Casey large quantities of sand and gravel for concrete were excavated from the spit in the vicinity of the proposed channel into the lake. There is nothing to indicate that any material other than sand and heavy gravel would be found if the channel were dredged. Although the nature of the material is not definitely known, it is certain that the material below the probings would not be less easy to remove than the material probed. Therefore, the estimates of cost are not high and may be somewhat low if more difficult material were found below elevation −9, the deepest probing. The side slopes of the basin and entrance channel are 1 on 2 for both plans.

30. *Plan A.*—This plan is identical with the improvement proposed in the survey report submitted by the Chief of Engineers June 2, 1939, except that the width of the entrance channel is increased from 100 feet to 150 feet for the reasons given in paragraph 27. The basin is in the form of an irregular quadrilateral enclosing an area of approximately 10 acres, a size considered adequate for all craft seeking anchorage. The entrance channel is adjacent to the bluff forming the easterly face of Admiralty Head, and the paralleling breakwater has a crest length of approximately 600 feet from the high point of the beach to a depth of approximately 45 feet at the toe of slope at the outer end. This plan is not shown on the drawing accompanying this report. Its cost is estimated as follows:

| | |
|---|---|
| Dredging, including 1 foot overdepth, 626,000 cubic yards, at 35 cents | $219, 100 |
| Breakwater, 67,000 tons, at $2.25 | 150, 750 |
| Total | 369, 850 |
| Engineering and contingencies, approximately 10 percent | 37, 150 |
| Total estimated cost | 407, 000 |

An entrance channel 100 feet wide would reduce the cost of this plan by only $10,000.

31. *Plan B.*—This is the plan recommended in this report, and it is shown on the accompanying drawing. The triangular basin has an area of about 6 acres and is designed specifically for the accommodation of the ferry slip and the Quartermaster wharf, other utility being incidental. By properly locating the terminals within this basin, the width available for turning a vessel preparatory to leaving the harbor would be practically the same as that available in plan A. The breakwater extends into the same depth as contemplated in plan A, but is considerably shorter because it is located on a more precipitous portion of the beach. The quantity of stone required is consequently reduced by more than one-half. The cost of the improvement is estimated as follows:

| | |
|---|---|
| Dredging, including 1 foot overdepth, 400,000 cubic yards, at 35 cents | $140, 000 |
| Breakwater, 28,000 tons, at $2.25 | 63, 000 |
| Total | 203, 000 |
| Engineering and contingencies, about 10 percent | 20, 000 |
| Total estimated cost | 223, 000 |

An entrance channel 100 feet wide would reduce the cost of this plan by $8,000. A basin with an area of about 10 acres, instead of 6 acres, would increase the cost of the plan by $62,000.

32. *Vessel traffic.*—The only commercial vessel engaged on this route is a wooden ferryboat about 100 feet long, 30-foot beam, drawing about 7½ feet of water. It would be the principal user of the proposed improvement. The United States Army mine planter *Major General J. Franklin Bell*, which has a length of 172 feet, 32-foot beam, and draft of about 12 feet, and the distribution box launch *L–35* are at present assigned to the harbor defenses and would make occasional use of the improvement. The triangular shape of the basin has been planned specifically to provide turning room for a vessel the size of the mine planter and still restrict the dredged area to the smallest practicable figure. The United States Coast Guard operates the following classes of boats in Puget Sound waters for the enforcement of navigation and customs laws:

Six 36-foot picket boats,
Three 75-foot patrol boats,
Two 78-foot patrol boats,
One 165-foot patrol boat,
One harbor cutter,

ranging in draft from 4 to 12 feet. These boats often operate in the vicinity of Port Townsend and it has been stated by the division commander that they would use the proposed improvement as a base and as a harbor of refuge. The limited size of the basin contemplated does not lend itself satisfactorily to establishment of a Coast Guard base, although it could harbor one or two of the smaller boats. In addition to the boats just listed, the basin could be used as a refuge by a very limited number of tugs, fishing, and pleasure boats during stormy weather.

33. *Difficulties attending navigation.*—The west coast of Whidbey Island offers no protected harbor for a distance of some 60 miles. Small boats navigating those waters are hard-pressed for shelter in the event of a sudden storm. The Keystone ferry is unable to operate during the winter season because the vertical motion of the boat while lying at the dock in a heavy sea makes impossible the transfer of automobiles to or from the dock.

34. *Aids to navigation.*—The only additional aid to navigation required in event the proposed improvement is accomplished is a light at the end of the breakwater. The Coast Guard has not been contacted with regard to such a light, but because the cost of installation would be nominal, no objection would be anticipated.

35. *Analysis of economic justification.*—Papers submitted by the Puget Sound Navigation Co. with their letter of October 4, 1940, show that during the present 5-month operating season of the Keystone ferry (May to September, inclusive), about 20,000 passengers and 10,000 vehicles were handled. An improved harbor would permit operation of the ferry the other 7 months of the year. The following estimate of the amount of traffic that might be expected during this period is based on records for the Edmonds-Ludlow ferry. These show that the number of vehicles carried during the 5 months from May to September, inclusive, was 23,000, as against 25,000 for the other 7 months of the year. The latter figure, of course, includes traffic diverted from the inoperative Keystone route. Assuming that the ratio of winter traffic to summer traffic would be the same for

both routes, if the Keystone route operated during the winter, we find the probable winter traffic over the Keystone route as 7,575 vehicles.

36. Another approach to a figure for the probable winter traffic over the Keystone route is based on a statement by an official of the ferry company to the effect that when a 4-month service to the San Juan Islands was extended to a year-round operation about 10 years ago, the traffic for the 8 winter months equaled that for the 4 summer months. That is, the winter rate of traffic was one-half the summer rate. For the Keystone route this would amount to $\frac{1}{2} \times \frac{7}{5}$, or $\frac{7}{10}$ of 10,000=7,000 vehicles.

37. In the following analysis, the probable traffic is assumed at approximately the mean of the figures arrived at in paragraphs 33 and 34, or 7,300 vehicles. Passenger traffic is assumed at twice as many persons as vehicles. The table shows the comparative costs of travel by auto and ferry by alternative routes from several Puget Sound cities to Port Townsend. Costs of auto operation are computed on the basis of 5 cents a mile, and ferry costs for auto (including driver) and two passengers are as here shown:

| | |
|---|---|
| Edmonds to Port Townsend | $3.85 |
| Mukilteo to Columbia Beach | 1.05 |
| Keystone to Port Townsend | 1.70 |

| City | Population (1940 census) | Cost via direct auto road to Port Townsend | Cost via auto to Edmonds, and Edmonds-Port Ludlow ferry (mileage, Ludlow to Port Townsend omitted) | Cost via auto to Mukilteo, Mukilteo-Columbia Beach ferry, auto from Columbia Beach to Keystone and Keystone-Port Townsend ferry | Cost via auto to Keystone, and Keystone-Port Townsend ferry |
|---|---|---|---|---|---|
| Olympia | 12,000 | $5.05 | $7.60 | $8.15 | $10.35 |
| Tacoma | 107,000 | 6.65 | 6.20 | 6.75 | 7.75 |
| Seattle | 366,000 | 8.20 | 4.65 | 5.20 | 7.10 |
| Everett | 31,000 | 9.45 | 4.65 | 4.25 | 5.65 |
| Mount Vernon | 4,000 | 11.65 | 6.55 | 6.15 | 3.75 |
| Anacortes | 7,000 | 12.45 | 7.35 | 6.95 | 3.25 |
| Bellingham | 31,000 | 12.45 | 7.65 | 7.25 | 4.60 |

NOTE.—Figures are underscored to emphasize cheapest of 4 routes from given city to Port Townsend.

38. From the preceding table it is apparent that the Keystone route is economically used only by traffic originating at or to Everett and points north. Assuming that the amount of traffic to and from each locality varies directly as the population, we arrive at the following number of vehicles for each:

| | |
|---|---|
| Everett | 3,100 |
| Mount Vernon | 400 |
| Anacortes | 700 |
| Bellingham | 3,100 |
| Total | 7,300 |

39. The total saving is then estimated by multiplying the difference in cost between the Keystone route and the cheapest alternative route, by the number of vehicles, as follows:

| | | | |
|---|---|---|---|
| Everett | 3,100 | ($4.65−$4.25=$0.40) | $1,240 |
| Mount Vernon | 400 | ($6.55−$3.75=$2.80) | 1,120 |
| Anacortes | 700 | ($7.35−$3.25=$4.10) | 2,870 |
| Bellingham | 3,100 | ($7.65−$4.60=$3.05) | 9,455 |
| Total | | | 14,685 |

40. Based on the district engineer's report of June 6, 1938, annual savings that would be realized on the Quartermaster wharf and the ferry slip are estimated as follows:

| Item | Savings in maintenance | Savings in depreciation (15-year life) | Savings in interest (3 percent of $4,000 and $16,000) | Total annual savings |
|---|---|---|---|---|
| Ferry slip | $300 | $267 | $120 | $687 |
| Quartermaster wharf | 1,000 | 1,067 | 480 | 2,547 |
| Total | | | | 3,234 |

41. It is concluded that the total annual savings susceptible of evaluation that would result from the proposed improvement amount to $14,685+$3,234=$17,919.

42. Annual carrying charges on the improvement contemplated in plan A are estimated as follows:

| | |
|---|---|
| Interest, 3 percent of $407,000 | $12,210 |
| Amortization (25-year life at 3 percent), 2.74 percent of $407,000 | 11,152 |
| Maintenance | 5,000 |
| Total annual cost | 28,362 |

The ratio of benefits to costs is 0.63 to 1 and the plan is therefore economically infeasible.

43. Annual carrying charges on the improvement contemplated in plan B are estimated as follows:

| | |
|---|---|
| Interest, 3 percent of $223,000 | $6,690 |
| Amortization (25-year life at 3 percent), 2.74 percent of $223,000 | 6,110 |
| Maintenance | 3,000 |
| Total annual cost | 15,800 |

The ratio of benefits to costs is 1.13 to 1 and the plan is therefore economically feasible. Increasing the size of the basin from 6 to 10 acres would reduce the ratio of benefits to costs to 0.88 to 1, thus making that plan economically infeasible on the basis of tangible benefits only.

44. From the foregoing it is seen that plan A cannot be economically justified and that the margin of justification of plan B is not particularly substantial. However, the savings that have been considered do not include those that would be realized from regular motor freight and bus service which would undoubtedly result from continuous ferry operation. The amount of these savings cannot be predicted at this time. Furthermore, aside from savings to the Quartermaster wharf, no value has been assigned to the improvement as a national-defense measure for the Army and Navy, although this may be a pertinent item as the harbor would facilitate the transfer of men, equipment, and supplies. Benefits to the Coast Guard and to small-boat traffic are also intangible. If all these intangible benefits could be evaluated, the ratio of benefits to carrying charges would be even more favorable than the figure given.

45. *Water power and flood protection.*—The proposed improvement involves no possibilities of water power or flood protection.

46. *Other special subjects.*—It is believed that the addition of a jetty would have no eroding influence on the shore line.

47. In paragraph 4 attention was called to the constant accretion of gravel on the bay side of the spit. Such accretion would take place on the east side of the proposed jetty. It is believed that the entrance to the suggested channel would not be shoaled by the same action.

48. Aside from providing a refuge for small boats, this improvement would not further the interests of recreation, fishing, and boating.

49. There seems no prospect of reclaiming through dredging any land that might be used as an airfield. An old trestle extending from the north shore toward the spit bisects the lake. The removal of this trestle would permit the use of the lake for an emergency seaplane landing base but such use would be entirely independent of the present improvement.

50. Proponents of the improvement have stressed the possibility of reclaiming the bed of the lake, about 500 acres, by draining it into the basin through tide gates. Such reclaimed land would not be of sufficient value to afford any contribution to the cost of improvement if made a part of it. This feature is independent of the proposed work and could be done at any time and at various other locations on the spit.

51. *Discussion.*—The proposed improvement would have no influence on foreign or coastwise commerce. It would, however, make possible the year-round operation of the Port Townsend-Whidbey Island ferry, which in conjunction with the Deception Pass Bridge, and to a lesser degree the Mukilteo-Columbia Beach ferry, offers the most direct and most economical route from Olympic Peninsula communities to Whidbey Island and the mainland to the eastward. Dependable and continuous operation of the ferry would result in a considerable increase in traffic and a resultant saving in transportation costs estimated at almost $15,000 annually. It is very probable that regular truck and bus lines would be established, with consequent reduction in freight and passenger rates.

52. The excessive cost of maintaining wharves in Admiralty Bay is apparently justly emphasized by the commanding officer of Harbor Defenses of Puget Sound and by the Puget Sound Navigation Co. Wharves could be constructed in the basin where they would be free from destructive wave action, and a ferry slip there would not require a long approach, consequently a tangible benefit from the improvement to both private interests and to the Government may be predicated upon the savings represented by the differences in cost of constructing and maintaining terminals in the basin as compared with what would be spent for terminals in the bay.

53. Both the ferry slip and the Quartermaster wharf will need replacing in the near future if they are to be continued in use. If constructed in the proposed basin, a saving of $4,000 for the ferry slip and $16,000 for the Quartermaster wharf could be effected and the annual savings in maintenance, interest, and depreciation are estimated at more than $3,000.

54. The improvement proposed in this report has been planned principally as a harbor to accommodate the Keystone ferry slip and the Quartermaster wharf. To keep costs within justifiable limits, the size of the basin has been restricted to what is believed to be the

minimum practicable dimensions. However, a limited space would be available that might occasionally serve as a refuge for small boats encountering stormy weather in the vicinity. One or two of the smaller Coast Guard boats could also be accommodated, thus creating an intangible benefit to the Government. If at any time in the future, traffic conditions should justify a larger basin, the expansion could be readily accomplished with little or no increase over the unit cost of dredging the original project. Extension of the breakwater could be similarly accomplished if more protection from storms and from littoral drift is found desirable.

55. A tangible saving would accrue to the Army as indicated in paragraph 53. An intangible benefit would accrue to the Army by reason of the increased facility with which Army personnel and equipment could be moved to and away from Fort Casey. The commandant of the Thirteenth Naval District has written to the Navy Department urging favorable action in providing such a protected harbor in Crockett Lake in the interest of naval operations.

56. The spit through which the channel would have to be dredged is composed of heavy gravel. Accurate records are not available but it is believed that this spit is increasing in width to the south at the rate of about 1 foot annually owing to accretions of gravel brought from the bluffs to the east and south by the prevailing westerly set of the littoral current, which at times attains a velocity estimated at 6 or 7 knots. The beach in front of the spit has a steep grade and is exposed to the southerly storms that prevail during the winter season. The breakwater or jetty on the east side of the entrance is required to prevent the encroachment of gravel into the channel, and to protect the channel entrance during stormy weather. It is proposed to have the axis of the channel at an angle to the beach line to facilitate entrance by a vessel crabbing into the current, and to procure such measure of protection from southerly storms as would be afforded by the breakwater. Protection from the west would be afforded by the high bluff of Admiralty Head and therefore, navigation interests believe that vessels could enter and leave the harbor during all westerly storms.

57. *Conclusions.*—A harbor with an area of approximately 6 acres dredged to a depth of 18 feet in Crockett Lake and connected to Admiralty Bay by a channel 150 feet wide protected by a breakwater, would permit extension of the Keystone ferry service to a year-round operation at a considerable saving to traffic now using alternative routes during the winter season. Continuous ferry service would probably result in the establishment of regular motor freight and bus service to the Olympic Peninsula with subsequent reduction in transportation costs. A sheltered harbor would effect a reduction in the cost of maintaining the ferry slip and the Quartermaster wharf. Small boats encountering storms in the vicinity would find refuge within the basin. One or two of the smaller Navy or Coast Guard boats could use the harbor as a base. The movement of Army and Naval personnel and equipment between Fort Casey and other localities on Puget Sound and national defense in general, would be facilitated by having the Quartermaster wharf in protected waters.

58. Savings anticipated as a result of the improvement total $17,919 annually, as against estimated annual carrying charges of $15,800, a ratio of benefits to costs of 1.13 to 1. Actually a more favorable

ratio would be expected, as several anticipated but intangible benefits have not been evaluated or included in the above figure. It is therefore concluded that the United States would be justified in undertaking the improvement.

59. The area to be benefited by the improvement includes the Puget Sound mainland between Everett and the Canadian boundary, and all Olympic Peninsula points from Port Townsend to Neah Bay. Benefits to the Coast Guard, to small-boat traffic and to national defense would have even greater scope and the improvement is consequently of national as well as local significance. Local cooperation is therefore considered necessary only to the extent of furnishing the terminal facilities required by prospective commercial traffic.

60. *Recommendations.*—In view of the foregoing, I therefore recommend the adoption by the United States of a project involving improvement by dredging a basin in Lake Crockett with an area of approximately 6 acres to a depth of 18 feet at mean lower low water, connected to Admiralty Bay by a channel of the same depth and 150 feet wide, protected by a breakwater, at an estimated first cost of $223,000, and $3,000 annually thereafter for maintenance, provided local interests furnish and maintain the terminal facilities required by prospective commercial traffic. The entire amount of $223,000 should be made available in a lump sum for the proper and economical execution of the work, as the entire project should be completed in one working season.

B. C. DUNN,
*Colonel, Corps of Engineers,*
*District Engineer.*

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[First endorsement]

OFFICE, DIVISION ENGINEER,
NORTH PACIFIC DIVISION,
*Portland, Oreg., March 7, 1941.*

To the CHIEF OF ENGINEERS,
*United States Army.*

1. I concur in the report and recommendation of the district engineer.

R. PARK,
*Colonel, Corps of Engineers,*
*Division Engineer.*

60158—41——2

WAR DEPARTMENT

CORPS OF ENGINEERS, U.S.ARMY

# CHANNEL FROM PUGET SOUND INTO LAKE CROCKETT WASHINGTON

In One Sheet

Scale: 1"=400'

100 0 500 1000 FT.

U.S. Engineer Office, Seattle, Wash., February 8, 1941.

Submitted: H.M. Baker, Senior Engineer

Approved: [signature], Colonel, Corps of Engineers

SURVEYED BY J.E.G.
TRACED BY A.E.M's

FILE Nº D-1-3-11

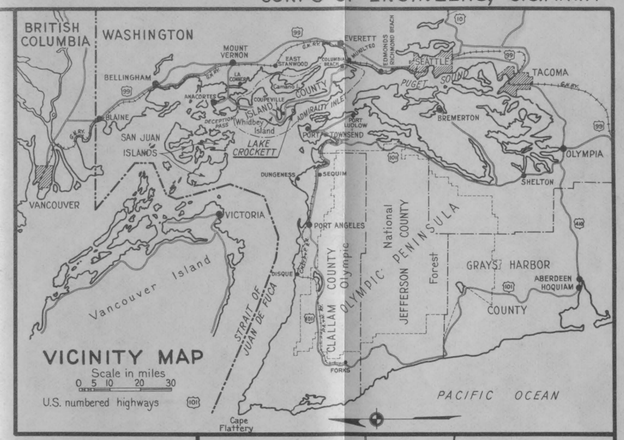
To accompany review of reports on the "Channel from Puget Sound into Lake Crockett, Wash.," dated February 8, 1941, and directed by a resolution of the Committee on Rivers and Harbors of the House of Representatives, adopted May 29, 1940.

Soundings and elevations are in feet and refer to the plane of Mean Lower Low Water. Soundings or elevations above the datum plane are prefixed with a plus (+) sign.

Probings with water jet indicated thus: -6.3 • (Elev. of bottom of hole)
Material encountered in all holes was sand, silt, and heavy gravel.

TIDAL PLANES

| | |
|---|---|
| Highest Tide | 12.3 |
| Mean Higher High Water | 8.8 |
| Mean High Water | 8.0 |
| Mean Tide Level | 5.4 |
| Mean Low Water | 2.8 |
| Mean Lower Low Water | 0.0 |
| Lowest Tide | -4.5 |

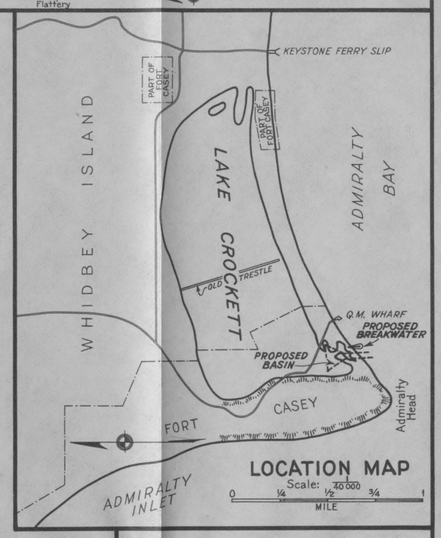



VICINITY MAP

Scale in miles

0 5 10 20 30

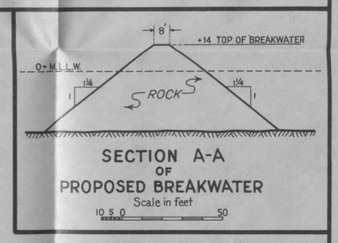
U.S. numbered highways




LOCATION MAP

Scale: 1/10 000

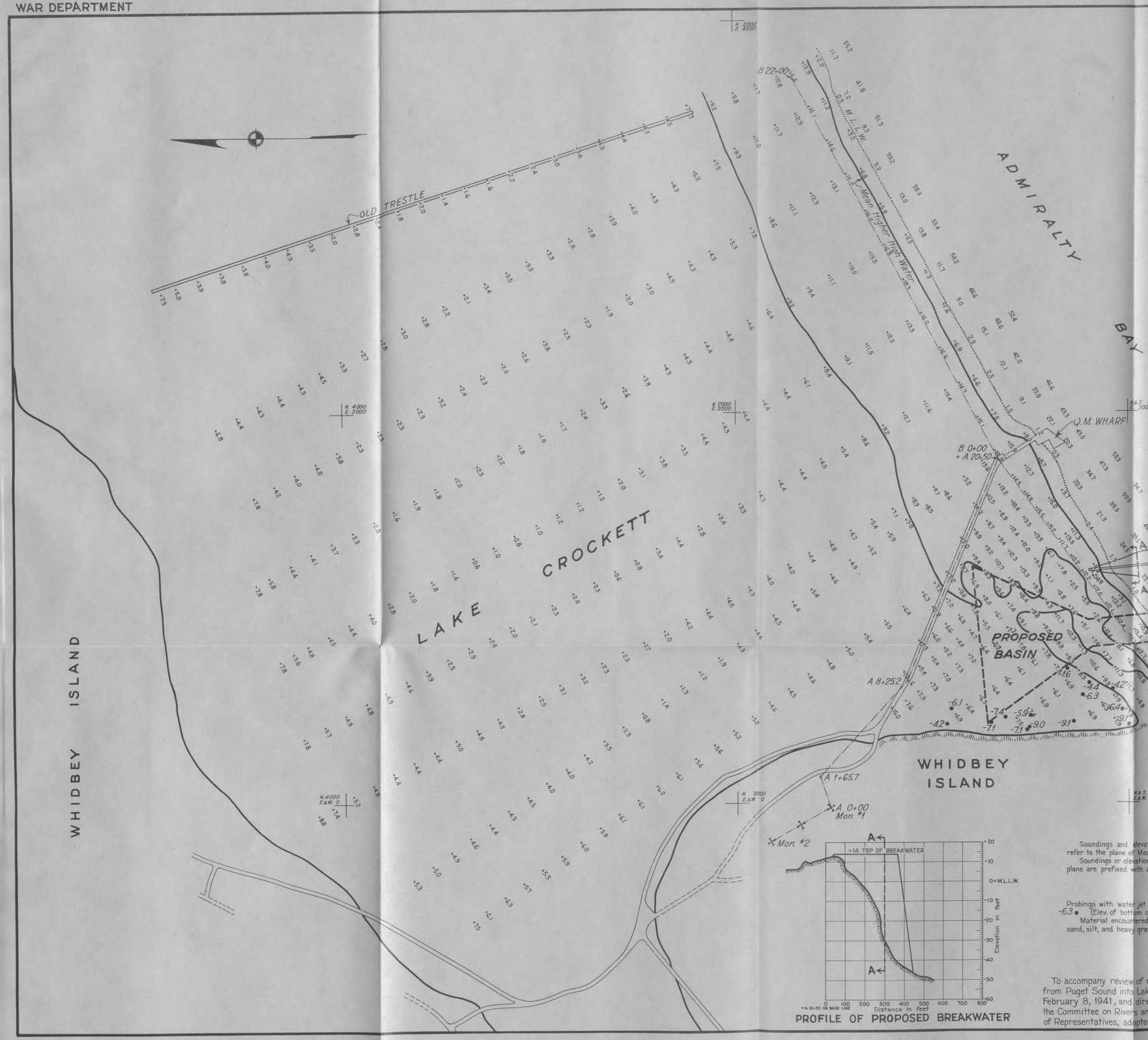
0 1/4 1/2 3/4 1 MILE




SECTION A-A
OF
PROPOSED BREAKWATER

Scale in feet

10 5 0 50







PROFILE OF PROPOSED BREAKWATER

HOUSE DOC. NO. 303, 77TH CONG., 1ST SESSION

U. S. GOVERNMENT PRINTING OFFICE : 1941—O-60158